Introduction

The purpose of this lab is to provide the students basic understanding of DSB-SC Amplitude Modulation and Demodulation in MATLAB/Simulink.

Course Learning Outcomes

CLO2: Develop software simulations to observe the performance of analog and digital communication systems.

CLO4: Report desired results proofs and calculations.

Equipment

- Software
  - MATLAB

Instructions

- This is an individual lab. You will perform the tasks individually and submit the required files at the end of the lab.
- Plagiarism or any hint thereof will be dealt with strictly. Any incident where plagiarism is caught, both (or all) students involved will be given zero marks, regardless of who copied whom. Multiple such incidents will result in disciplinary action being taken.

Quadrature Amplitude Modulation (QAM):

QAM can be exactly generated without requiring sharp-cut-off band pass filters. QAM operates by transmitting two DSB signals using carriers of the same frequency but in phase quadrature, as shown in Figure below. This scheme is known as quadrature amplitude modulation (QAM) or quadrature multiplexing.

As shown in figure the boxes labelled -pi/2 are phase shifters that delay the phase of an input sinusoid by -n /2 rad. If the two baseband message signals for transmission are m1 (t) and m2 (t), the corresponding QAM signal φQAM (t), the sum of the two DSB-modulated signals, is

$$\varphi_{QAM}(t) = m_1(t) \cos \omega_c t + m_2(t) \sin \omega_c t$$
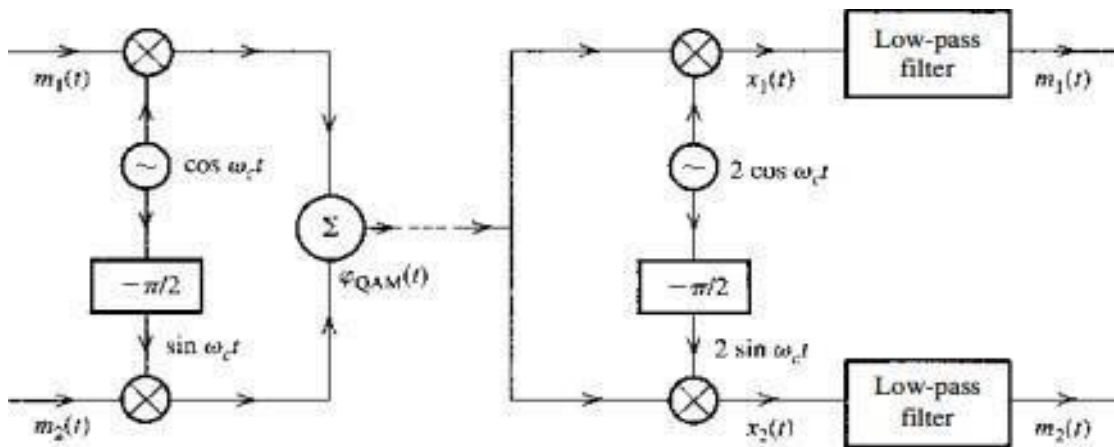
Both modulated signals occupy the same band. Yet two baseband signals can be separated at the receiver by synchronous detection if two local carriers are used in phase quadrature, as shown in Figure.

Com. Sys. Lab 6 Rubric

Method of Evaluation: Executable code, Report submitted by students **Measured**
Learning Outcomes:

CLO2: Develop software simulations to observe the performance of analog and digital communications systems.

CLO4: Report desired results proofs and calculations.

	Excellent 10	Good 9-7	Satisfactory 6-4	Unsatisfactory 3-1	Poor 0	Marks Obtained
Code (CLO2)	Correct code, easily understandable with comments where necessary	Correct code but without proper indentation or comments	Slightly incorrect code with proper comments	Incorrect code with improper format and no comments	Code not submitted	
Output (CLO2)	Output correctly shown with all Figures/ Plots displayed as required and properly labelled	Most Output/ Figures/ Plots displayed with proper labels	Some Output/ Figures/ Plots displayed with proper labels OR Most Output/ Figures/ Plots displayed but without proper labels	Most of the required Output/ Figures/ Plots not displayed	Output/ Figures/ Plots not displayed	
Answers (CLO2)	Meaningful answers to all questions. Answers show the understanding of the student.	Meaningful answers to most questions.	Some correct/ meaningful answers with some irrelevant ones	Answers not understandable/ not relevant to questions	Wrong Answers	
Lab Report (CLO4)	Report submitted with proper grammar and punctuation with proper conclusions drawn and good formatting	Report submitted with proper conclusions drawn with good formatting but some grammar mistakes OR proper grammar but not very good formatting	Some correct/ meaningful conclusions. Some parts of the document not properly formatted or some grammar mistakes	Conclusions not based on results. Bad formatting with no proper grammar/ punctuation	Report not submitted	
Total						